

Mesozoic marine reptile palaeobiogeography in response to drifting platesBardet N.¹, Fischer V.², Houssaye A.³, Jouve S.⁴, Pereda Suberbiola X.⁵, Pérez-García A.⁶, Rage J.-C.¹ & Vincent P.⁶¹ CNRS UMR 7207, Department. Earth history, MNHN, France² Department. Geology, University of Liège / Department. Paleontology, RBINS, Brussels, Belgium³ Steinmann Institute for Geology, Paleontology and Mineralogy, University of Bonn, Germany⁴ Museum of Natural History, Marseille, France⁵ Dept. Estratigrafía y Paleontología, Facultad de Ciencia y Tecnología, University of the Basque Country, Spain⁶ Dept. Paleontología, Facultad de Ciencias Geológicas, Universidad Complutense, Madrid, Spain⁷ Staatliches Museum für Naturkunde, Stuttgart, Germany

Mesosaurus Broom, 1913, from the Early Permian, is the first aquatic reptile known in the fossil record. Its co-occurrence in both South Africa (South Africa) and South America (Brazil, Uruguay) made it one of the key-fossils - with the pteridospermatophyte plant *Glossopteris* - used by the German meteorologist / geophysician Alfred Wegener to support his theory of the Continental Drift (Kontinentalverschiebung), first published in 1912.

But *Mesosaurus* was only the “tip of the iceberg” as, during the Mesozoic, various clades of reptiles massively invaded the aquatic, and more especially, the marine realm. They were highly diversified both systematically and ecologically, and some of them were large top-predators of the marine ecosystems. The main groups were, in order of appearance in the fossil record, Ichthyosauria (earliest Triassic – early Late Cretaceous), Sauropterygia (nothosaurs, pachypleurosaurids, placodonts, plesiosaurs; Early Triassic – latest Cretaceous), Thalattosauria (Middle-Late Triassic), Pleurosauria (Early Jurassic–Early Cretaceous), as well as, among others, several lineages of Chelonians (e.g. chelonoids, bothremydids, “thalassemyds”), Crocodyliformes (thalattosuchians, dyrosaurids, pholidosaurids, gavialoids) and Squamates (mosasaurids, “dolichosaurs”, marine snakes).

During the Mesozoic, the palaeobiogeographical distributions and the dispersion events of these marine reptiles closely followed the break-off of the Pangea induced by plate tectonic movements. Although marine reptiles can help in determining the possible date of opening of marine corridors, the information they provide are less precise than that delivered by terrestrial faunas, as the marine realm is a more open system and various migration ways are always possible.

Generally, the Triassic taxa were animals with a restricted palaeobiogeographical distribution living near the coastlines of the Pangea. From the end of the Triassic and during the Jurassic, the break-off of the Pangea resulted in the formation of large marine corridors, allowing open-sea marine reptiles such as ichthyosaurs, plesiosaurs and crocodyliformes to spread out over large distances. As an example, similar marine reptile faunas are known from the Jurassic of Europe and southern South America, as a result of dispersion events via the Hispanic Corridor that connected the Tethys / North Atlantic and Pacific realms at this time. During the Cretaceous, and notably with the expansion of the Atlantic Ocean, most of these reptiles were cosmopolite and open-sea forms (plesiosaurs, mosasaurid squamates, chelonoid turtles). However, even if large faunal interchanges were possible, some provinces such as the Northern and Southern margins of the Tethys were characterized by a peculiar faunal identity, notably concerning mosasaurids, despite the apparent absence of barriers. So, if Continental Drift enabled circulation and faunal interchanges, other parameters such as ecological constraints probably also played a role in the distribution of these marine reptile faunas.